

REMARKS / ARGUMENTS

Disposition of the Claims

The present response is intended to be a full and complete response to the Final Office Action mailed May 28, 2009. Claims 11 and 13 to 22 are pending in the present application. Applicants respectfully request continued examination of claims 11 and 13 to 22, as amended, and allowance of all pending claims.

Amendments to the Claims

Claims 11, 14 and 22 have been amended to replace the phrase "an inlet pressure drop" with the phrase "a net positive suction head". Support for this amendment may be found at page 1, lines 32 to 36 of the specification as filed. In addition, the content of claim 12 has been incorporated into claim 11. Accordingly, claim 12 has been cancelled. Claim 11 has also been slightly reorganized for clarity.

Applicant respectfully requests entry of these amendments.

First 35 U.S.C. § 103 Rejection

The Examiner rejects claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Brigham, U.S. Patent No. 4,662,181 (hereinafter "Brigham") in view of Drube et al., U.S. Patent Publication No. 2003/0126867 (hereinafter "Drube"). In the text of the rejection, the Examiner also references claims 16, 17 and 18. Accordingly, this rejection is respectfully traversed with regard to claims 11, 16, 17 and 18, as amended.

The initial burden of establishing a prima facie case of obviousness rests with the Examiner. In order to establish a prima facie case of obviousness, the factual inquiries of *Graham v. John Deere Co.* 383 U.S. 1 (1966) must first be resolved. The factual inquiries are as follows:

- A. determining the scope and content of the prior art;
- B. ascertaining the differences between the claimed invention and the prior art;
- C. resolving the level of ordinary skill in the art; and
- D. considering any objective indicia of nonobviousness.

After addressing these factual inquiries, the Examiner must then determine whether the claimed invention would have been obvious to one of ordinary skill in the art.

Applicant respectfully submits that the combination of Brigham and Drube does not provide a *prima facie* case of obviousness as the combination of these two references does not provide a pump system as recited in claim 11, as amended. While the result of the present system and the prior art system may be the same (subcooling fluid at the pump entrance), the means to achieve this result differ with the present system providing a much more simple solution compared to Brigham—even when Brigham is combined with Drube.

The present invention provides for a system which allows for “maintaining the pressure in the suction line at most as high as the cryogenic fluid saturation pressure plus the net positive suction head (NPSH) of the cryogenic pump cryogenic fluid pumping system” that includes:

- at least one cryogenic fluid tank,
- a cryogenic pump having an inlet pressure drop (NPSH);
- a suction line connecting said tank to said pump,
- means for controlling the pressure in the suction line comprising control means for pressurizing the at least one cryogenic fluid tank and control means for depressurizing the at least one cryogenic fluid tank.

As claims 16, 17 and 18 each depend from claim 11, Applicant notes that these claims are also not obvious when considered in view of the prior art cited by the Examiner. With regard to the Examiner’s comments, the Examiner states that Brigham does not teach a means for controlling both a pressurizing and depressurizing means but Drube does and that it would have been obvious to one having ordinary skill in the art of pumping systems at the time of the invention to combine the pressure monitoring system taught by Drube with the pumping system taught by Brigham. Applicant respectfully disagrees with regard to claims 11, 16, 17 and 18, as amended.

The primary reference cited by the Examiner, Brigham, teaches a method of pumping cryogenic fluid that comprises a series of steps involving a complex structure with a booster pump and an intermediate vessel. Brigham teaches to not monitor temperature in the suction line but to instead build the required pressure at the inlet of the pump by means of a pressure sensor and an additional pump. Brigham does not disclose that is it possible to use a pressure sensor and a temperature sensor in the suction line to monitor the pressure in the suction line

and to control the pressure in the suction line by controlling both a pressurizing means and a depressurizing means within a cryogenic fluid tank with the objective to maintain the pressure in the suction line at most as high as the cryogenic fluid saturation pressure plus the net positive suction head (NPSH) of the cryogenic pump.

As noted in claim 11 of the present invention, the pumping system comprises at least one cryogenic fluid tank, a cryogenic pump having a net positive suction head (NPSH) and a suction line connecting the tank to the pump and means for controlling the pressure in the suction line. The means for controlling the pressure in the suction line comprises 1) control means for pressurizing the at least one cryogenic fluid tank and 2) control means for depressurizing the at least one cryogenic fluid tank in order to maintain the pressure in the suction line at most as high as the cryogenic fluid saturation pressure plus the net positive suction head (NPSH) of the cryogenic pump. In the present invention, the sensors are placed in the suction line since the objective is to control the pressure in the suction line at the level noted by the Applicants in claim 11. The system includes control means for pressurizing the at least one tank and control means for depressurizing the at least one tank in order to adjust the pressure to meet the pressure requirements in the suction line.

The secondary reference cited by the Examiner, Drube, discloses a high pressure cryogenic fluid dispensing system that features a pressure building coil. As noted in paragraph [0032] of Drube:

A controller 74 monitors the pressure within tank 10 via pressure sensor 76.... The controller configures the PB regulating valve 26 and the automated vapor space withdrawal control valve 62 based upon the pressure within the tank 10. More specifically, the controller 74 features a set point that is generally equal to the lower limit of the operating pressure range of the system. When the pressure within the tank is below the set point, as illustrated in FIG. 1A, valve 26 is opened and valve 62 is closed. As will be explained in greater detail below, when the pressure within the tank rises above the set point, the PB regulating valve 26 is automatically closed and the automated vapor space withdrawal control valve 62 is automatically opened.

Controller 74 may be a microcomputer or any other component (either electrical or mechanical/hydraulic) known in the art for controlling automatic valves.

In other words, Drube is concerned with the pressure in the tank. The Examiner relies upon this secondary reference for a means for controlling both pressurizing and depressurizing. However, this reference fails to address how to maintain the pressure in the suction line at most as high as the cryogenic fluid saturation pressure plus the net positive suction head (NPSH) of the cryogenic pump. Drube measures the pressure in the source tank and controls the pressure, not the temperature, by means of pressure measurements made.

The combination of the two references cited by the Examiner actually teach away from monitoring the pressure and temperature in the suction line of the pump to provide pressurizing means and depressurizing means to maintain the pressure in the suction line at most at the level claimed. The claimed system uses a temperature measure in the suction line so that the pressure in the suction line can be controlled precisely as a function of the saturation pressure.

In view of the above, Applicant maintains that claim 11 when considered in view of Brigham and Drube is patentable over the combination of these references. As claims 16, 17 and 18 depend from claim 11, Applicant maintains that these claims are also patentable over the combination of Brigham and Drube. Applicant therefore respectfully requests that the 35 U.S.C. § 103(a) of claims 11, 16, 17 and 18 be withdrawn.

Second 35 U.S.C. § 103 Rejection

The Examiner rejects claim 15 under 35 U.S.C. § 103(a) as being unpatentable over Brigham in view of Drube as applied to claim 11 above and in further view of Horak, U.S. Patent No. 3,960,295 (hereinafter "Horak"). In the text of the rejection, the Examiner also references claim 21. Therefore, this rejection is respectfully traversed with regard to claims 15 and 21.

The Examiner states that it would have been obvious to one having ordinary skill in the art of pumping systems at the time of the invention to provide the fluid system as taught by Brigham as modified by Drube with a two tank system as taught by Horak. Applicant maintains that Horak does not overcome the deficiencies of Brigham in view of Drube as

discussed above with regard to the First 35 U.S.C. § 103(a) Rejection. Horak merely teaches the use of two tanks.

In view of this, Applicant maintains that claim 15 is patentable over Brigham in view of Drube as applied to claim 11 and in further view of Horak. Accordingly, Applicant respectfully requests that the rejection of claims 15 and 21 under 35 U.S.C. § 103(a) be withdrawn.

Third 35 U.S.C. § 103 Rejection

The Examiner rejects claims 12, 13, 14, 19, 20, and 22 under 35 U.S.C. § 103(a) as being unpatentable over Brigham in view of Drube as applied to claim 11, 16, 17, and 18 above and in further view of Boissen, EP Patent No. 0010464 A (hereinafter “Boissen”). This rejection is respectfully traversed with regard to claims 13, 14, 19, and 22, as amended, as claim 12 has been cancelled.

Applicant maintains that Boissen does not overcome the deficiencies of Brigham in view of Drube as discussed above with regard to the Third 35 U.S.C. § 103(a) Rejection as Boissen merely discloses the use of temperature sensors.

In view of this, Applicant maintains that claims 13, 14, 19, 20 and 22, as amended, are patentable over Brigham in view of Drube and further in view of Boissen. Accordingly, Applicant respectfully requests that the rejection of claims 13, 14, 19, 20 and 22, as amended, under 35 U.S.C. § 103(a) be withdrawn.

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CONCLUSION

In view of the above, Applicants maintain that Claims 11 and 13 to 22, as amended, are now in condition for allowance. Early notice to this effect is earnestly solicited. Should the Examiner believe a telephone call would expedite the prosecution of the present application the Examiner is invited to call the undersigned attorney at the number listed below.

Respectfully submitted,



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